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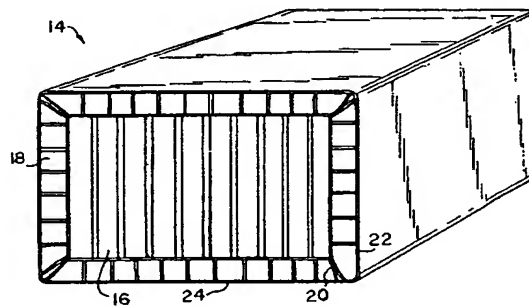
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(54) **MATERIAU ECONOMIQUE ET ECOLOGIQUE POUR PALETTES ET METHODE DE FABRICATION DES PALETTES**

(54) **ECONOMICAL AND ECOLOGICAL PALLET MATERIAL AND METHOD FOR MAKING THE SAME**

(57)

A low-cost, strong, and ecological pallet is constructed with pallet blocks having honeycomb cores. The honeycomb cores provide strength in the vertical direction, and their integrity is protected by a honeycomb material overwrap. The honeycomb material wrap provides exceptional strength against lateral forces. The pallet and pallet blocks may be manufactured of kraft material or other sturdy materials.





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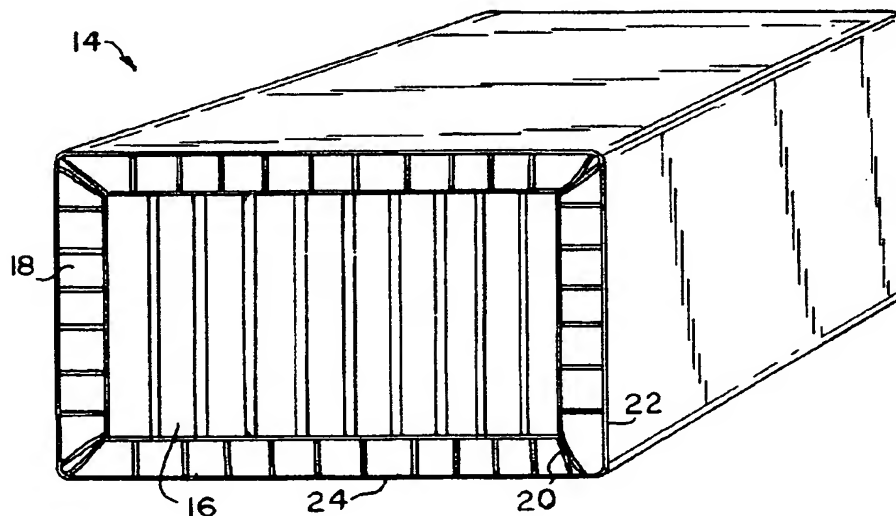
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(54) Title: ECONOMICAL AND ECOLOGICAL PALLET MATERIAL AND METHOD FOR MAKING THE SAME



(57) Abrégé/Abstract:

A low-cost, strong, and ecological pallet is constructed with pallet blocks having honeycomb cores. The honeycomb cores provide strength in the vertical direction, and their integrity is protected by a honeycomb material overwrap. The honeycomb material wrap provides exceptional strength against lateral forces. The pallet and pallet blocks may be manufactured of kraft material or other sturdy materials.

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ABSTRACT

A low-cost, strong, and ecological pallet is constructed with pallet blocks having honeycomb cores. The honeycomb cores provide strength in the vertical direction, and their integrity is protected by a honeycomb material overwrap. The
s honeycomb material wrap provides exceptional strength against lateral forces. The pallet and pallet blocks may be manufactured of kraft material or other sturdy materials.

**ECONOMICAL AND ECOLOGICAL PALLET MATERIAL AND METHOD
FOR MAKING THE SAME
FIELD OF THE INVENTION**

5 The present invention relates generally to packaging articles used in storage and transportation and more particularly relates to shipping pallets.

BACKGROUND OF THE INVENTION

10 The efficient shipping of articles in national and international industries relies to a great extent on the use of pallets, or shipping decks, upon which goods are stacked and transported. A common use of a pallet is as a deck for allowing the transport and organization of goods by forklifts, including automatic and hand-operated forklifts, and other lifting and moving devices. Pallets are also often used for storing goods between shipments, or for display of products at wholesale and retail vendors.

15 Pallets must be strong in the vertical direction to withstand heavy loads and they must be able to withstand considerable lateral force from shipping implements. One shipping practice that exerts considerable lateral force on a pallet is commonly known as "pinwheeling." In pinwheeling, pallets which are misaligned after being lowered are forced into alignment by the lift forks of a forklift. Because this practice is widespread, it is important that pallets be able to withstand lateral forces.

20 One pallet type currently used is a wooden pallet, constructed of wooden beams and decks. While wooden pallets are widely used, they do have significant shortcomings. For example, to dispose of a wooden pallet is a waste of resources. Further, when wooden pallets are broken, they must be repaired or destroyed. Also, wooden pallets are expensive, and to repeatedly use wooden pallets it is necessary to have a system for storing or exchanging the pallets. Another problem associated with wooden pallets is their weight. Wooden pallets tend to weigh seven or eight times that of paper pallets. Wooden pallets are also commonly manufactured with nails, and handlers of wooden pallets risk injury from nails or wood splinters. Plastic pallets are also available, but like wooden pallets they are expensive and not ecological. Plastic pallets may be twice as expensive as wooden pallets to manufacture. There exists a need for a pallet material that is lightweight, strong, and ecologically sound.

SUMMARY OF THE INVENTION

These problems and others are overcome by the pallets and pallet materials of the present invention.

According to one embodiment of the present invention, a pallet deck is supported by pallet blocks constructed of honeycomb material.

According to another embodiment of the present invention, a pallet deck is supported by pallet blocks constructed of honeycomb cores reinforced with honeycomb overwraps.

According to another embodiment of the present invention, a pallet deck is supported by pallet runners constructed of honeycomb material.

According to another embodiment of the present invention, a pallet deck is supported by pallet runners constructed of honeycomb cores reinforced with honeycomb overwraps.

The above summary of the present invention is not intended to represent each embodiment, or every aspect of the present invention. This is the purpose of the figures and detailed description which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

Other aspects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings.

FIG. 1 is a perspective view of a pallet according to one embodiment of the present invention;

FIG. 2 is a perspective view of a support block according to one embodiment of the present invention;

FIG. 3 is a cutaway view of a portion of honeycomb material used in the present invention;

FIG. 4 is a perspective view of a pallet runner according to one embodiment of the present invention;

FIG. 5 is a perspective view of a runner pallet construction according to one embodiment of the present invention;

FIG. 6 is a perspective view of a segmented runner pallet construction according to one embodiment of the present invention;

FIG. 7 is a perspective view of a supported runner pallet construction according to one embodiment of the present invention; and

FIG. 8 is a perspective view of an alternative pallet support block construction according to one embodiment of the present invention.

5 FIG. 9 is a perspective view of a support block according to an alternative embodiment of the present invention.

FIG. 10 is a perspective view of a support block having an overwrap that is slit-scored.

10 FIG. 11a is a perspective view of a support block according to an alternative embodiment of the present invention.

FIG. 11b is a frontal view of a stretched core of the support block of FIG. 11a.

FIG. 11c is a frontal view of a folded core of the support block of FIG. 11a.

15 While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the intent is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

20 DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a perspective view looking upwardly from the bottom of a pallet 10 of the present invention. The pallet 10 includes a pallet deck 12 and nine pallet support blocks 14. The pallet support blocks 14 are spaced so as to provide room for
25 a forklift or other lifting instrument to slide beneath the pallet deck 12 and to lift the pallet 10 and any goods being carried on the pallet 10. The pallet support blocks 14 are arranged to allow for four-way entry for forklifts or other lifting devices.

The pallet deck 12 may be constructed of a honeycomb material, which is described in greater detail below. Alternatively, the pallet deck 12 may be made of a
30 corrugated material. The corrugated pallet deck 12 may consist of one or more layers of corrugated material, depending on the application. For example, if the pallet deck 12 is to hold light items may only need a single corrugated layer. If the items stacked on the pallet deck 12 are heavier, two or even three layers of corrugated material may

be needed. Alternatively, the corrugated layers may be cross-laminated. Corrugated materials are stronger in one direction than another. A first corrugated layer is set, while a second corrugated layer is rotated 90 degrees and then laminated onto the first layer. This causes the pallet deck 12 to be strong in all four directions. It is also contemplated that the pallet deck 12 may be any combination of corrugated, honeycomb, and/or cross-laminated construction.

Turning now to FIG. 2, a pallet support block 14 is shown. The pallet support block 14 of FIG. 2 is constructed with a support block core 16 reinforced with a support block overwrap 18. As shown in FIG. 2, the support block core 16 has an approximately rectangular cross-section which is surrounded on four sides by the support block overwrap 18. Alternatively, pallet support blocks 14 may be constructed with the support block core 16 and reinforced by a support block overwrap 18 on fewer sides. The support block overwrap 18 provides the pallet support block 14 with resistance to lateral forces encountered during storage and shipment of the pallet 10.

The support block overwrap 18 may be made of honeycomb material, which is described in greater detail below. When the support block overwrap 18 is made of honeycomb material, the honeycomb material must be shaped to fit around the cross-section of the support block core 16. This may be accomplished through the use of corner structures 20. To make the corner structures 20, a flat sheet of honeycomb material may be slit-scored (FIG. 10), scored and crushed, or cut in a "V" shape, to provide the material with an ability to fold along desired lines. Crushed segments 22 of honeycomb material are visible in FIG. 2. Once the honeycomb material of the support block overwrap 18 has been scored, crushed, or cut and folded, the fold may be kept intact through the use of adhesive in the corner structure 20. Alternatively or additionally, folds in the support block overwrap 18 may be kept intact through the use of adhesive along the areas where the support block overwrap 18 contacts the support block core 16. When the support block overwrap 18 is made of a single sheet of honeycomb material formed around the shape of the support block core 16, an overwrap seam 24 results.

The support block overwrap 18 may be made of a wide range of thicknesses, with overwrap thicknesses of from about 0.25 inches to about two inches being particularly useful. The overwrap may further be placed so that the honeycomb

structure is oriented at a variety of angles, with a preferred orientation having the strongest dimension of the overwrap perpendicular to the surfaces of the support block core 16.

Turning now to FIG. 3, a honeycomb panel 26 is shown in a cutaway view to illustrate its structure wherein a honeycomb core 28 is sandwiched between a top face sheet 30 and a bottom face sheet 32. The honeycomb core 28 comprises a plurality of abutting partition walls 34 which extend generally perpendicularly between the top and bottom face sheets 30 and 32. The partition walls 34 form a plurality of abutting elongate hexagonal cells 36 having opposed bottom and top hollow-cell hexagonal faces on opposite sides of the honeycomb core 28. The top face sheet 30 and the bottom face sheet 32 are respectively abutted to the top and bottom hexagonal faces of the core 28.

Preferably, the honeycomb core 28 and the top and bottom face sheets 30 and 32 are made of a kraft paper. The face sheets 30 and 32 can be made of various weights of material. For example, the face sheets 30 and 32 may be made of paper or linerboard ranging from 26 pound paper or linerboard to 90 pound paper or linerboard, though heavier or lighter weights may also be used. Further, the face sheets 30 and 32 may be made of two different weights of paper or linerboard. Alternatively, one or both of the face sheets 30 and 32 may be made of chip board, a heavier duty paper product than 90 pound linerboard. Chipboard ranging from a thickness of about 8 mils to about 50 mils may be used, though thicker or thinner thicknesses of chipboard may be desirable in some applications. The core material may likewise be made of a variety of materials and weights. Twenty-six pound and 33 pound paper or liner board are preferred as the core material, though heavier or lighter paper or liner board may be used depending on the particular application. When honeycomb structures of the present invention are made of paper, an entire pallet 10 may be recycled with other paper products.

The hexagonal cells 36 have an internal diameter "W" ranging from about 0.375 of an inch to about 1.2 inches. Materials other than paper, linerboard, or chip board can also be used for the face sheets 30 and 32 and the honeycomb core 28. The support block 12 may be designed to withstand up to 240 lbs/block of dynamic weight and up to 1200 lbs/block of static weight, though higher weight limits may be supported.

In some embodiments, the support block 14 may include a pressure sensitive adhesive. The adhesive is used to attach the support block 14 to the pallet deck 12 or any other surface. By providing adhesive on the support block 14, the end user may omit the step, providing greater customer satisfaction with the product.

5 The pressure sensitive adhesive may be a prefabricated tape, a liquid adhesive, or a hot melt adhesive. If the liquid adhesive or hot melt adhesive is used, a release paper may be provided on the adhesive. The liquid adhesive may be a polyvinyl acetate or ethyl vinyl acetate.

Turning now to FIG. 4, a pallet runner 38 is shown. The pallet runner 38 is another form of pallet support for use with the present invention. The pallet runner 38 may be an elongated version of the pallet support block 14, or it may be constructed differently. The pallet runner 38 shown in FIG. 4 has two layers of honeycomb core 28 surrounded by a corrugated overwrap 40. The pallet support block 14 may also be constructed in this manner. Alternative constructions, such as a single layer of
15 honeycomb core 28 surrounded by a corrugated overwrap or a double layer of honeycomb core 28 surrounded by a honeycomb overwrap may be used to construct either a pallet support block 14 or a pallet runner 38.

The pallet runner 38 is shown in use with a pallet deck 12 in FIG. 5. In this embodiment, three pallet runners 38 are arranged to allow for a forklift to pick up the
20 pallet 10. The pallet runner 38 provides greater beam strength than the support blocks 14, since the runner 38 stretches across the entire width of the pallet deck 12. The pallet runners 38 may be designed to handle up to 30 lbs/inch in dynamic weight and up to 150 lbs/inch in static weight.

Another embodiment, illustrated in FIG. 6, combines the strength of the runner
25 38 and the accessibility of the support block 14. In this embodiment, the pallet deck 14 is shown being supported by a segmented runner 42. The segmented runner 42 includes a plurality of single layered runners 44 that extend across the entire width of the pallet deck 12. The single layered runners 44 may be made of a single layer of honeycomb as described in reference to FIG. 2 above.

30 Throughout the length of the single layered runners 44, blocks 46 are attached to the single layered runners 44. The blocks 46 may be constructed the same as the pallet support blocks 14 described above, or they may be constructed differently. In some embodiments, both the blocks 46 and the single layered runners 44 may be

surrounded by an overwrap 48, providing for dual protection at the points where the blocks 46 and the runners 44 overlap. Alternatively, the overwrap 48 may only go around the outside of the block 46 and runner 44 structure. In some embodiments, the overwrap 48 may be made of a honeycomb material, or it may be made of a corrugated material. This embodiment is useful because it combines the strength of the runner with the four way entry capability of the support blocks.

Turning now to FIG. 7, the pallet 10 is illustrated having a plurality of runners 38 and a bottom sheet 50. One end of the runner 38 is attached to the pallet deck 12, while the other end is attached to the bottom sheet 50. The bottom sheet 50 provides added support to the pallet 10. The bottom sheet 50 provides further stability to the runners 38, making the overall pallet 10 more sturdy. The bottom sheet 50 may be made of a honeycomb material as shown in FIG. 3, or it may be made of a corrugated material or paper or liner board.

Turning now to FIG. 8, a pallet block 52 according to another embodiment of the invention is illustrated. In this embodiment, the pallet block 52 includes a core 54 and an overwrap 56. The core 54 is made of two layers 58, 60 of honeycomb material. The overwrap 56 may be made of a honeycomb material or it may be made of a corrugated material.

In some alternative embodiments, the core 54 may be provided with face sheets covering the honeycomb inside of the core 54. The covering may be entirely made of chipboard or linerboard.

Turning now to FIG. 9, a support block 70 according to an alternative embodiment of the present invention will be described. The support block 70 includes an overwrap 72, in place of the honeycomb core of the embodiments described in reference to FIGS. 2 and 8. The overwrap 72 may be wrapped numerous times to add to the strength of the support block 70. Also, the overwrap 72 may be thicker than the overwraps 18, 56 described in FIGS. 2 and 8, to further strengthen the support block 70.

Turning now to FIGS. 11a-c, a support block 80 according to an alternative embodiment of the present invention will be described. The support block 80 includes a honeycomb core 82 and an overwrap 84. In this embodiment, the honeycomb core 82 is made of a slit and reverse-slit scored and folded material. As shown in FIG. 11b, the core 82 includes a plurality of slits 86 and reverse slits 88.

The slits 86 and reverse slits 88 allow the honeycomb core 82 to be folded as is illustrated in FIG. 11c.

While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

WHAT IS CLAIMED IS:

1. A block comprising:
a honeycomb core having a rectangular cross-section; and
a honeycomb overwrap attached to said honeycomb core along at least one
side of said rectangular cross-section.
5
2. The block of claim 1 wherein said honeycomb core and said honeycomb
overwrap are comprised of kraft material.
3. The block of claim 1 wherein said honeycomb overwrap is attached to said
10 honeycomb core along four sides of said rectangular cross-section.
4. The block of claim 1 wherein said honeycomb core comprises a first
honeycomb layer and a second honeycomb layer.
- 15 5. A pallet comprising:
a pallet deck; and
a honeycomb support attached to said honeycomb pallet deck, wherein said
honeycomb support includes a honeycomb core having a rectangular cross-section and
an overwrap attached to said honeycomb core along at least two sides of said
20 rectangular cross-section.
6. The pallet of claim 5, wherein said honeycomb support is a plurality of support
blocks arranged on said pallet deck to allow four-way entry underneath said pallet
deck.
25
7. The pallet of claim 5, wherein said honeycomb support is a plurality of support
runners, extending across a width of said pallet deck.
8. The pallet of claim 7, wherein said core is comprised of a first honeycomb
30 layer and a second honeycomb layer.

9. The pallet of claim 7, wherein said overwrap comprises a honeycomb overwrap.

35 10. The pallet of claim 7, wherein said overwrap comprises a corrugated overwrap.

11. The pallet of claim 5, wherein said support comprises a plurality of runners and a plurality of support blocks, at least one of said support blocks being attached to
40 each of said plurality of runners.

12. The pallet of claim 11, wherein said support blocks are attached to said runners by said overwrap.

45 13. The pallet of claim 12, wherein said overwrap is a corrugated overwrap.

14. The pallet of claim 13, wherein said overwrap is a honeycomb overwrap.

15. The pallet of claim 5, further comprising a bottom sheet attached to said
50 honeycomb support.

16. A runner comprising:

a honeycomb core having a rectangular cross-section, a first honeycomb layer and a second honeycomb layer; and

55 a honeycomb overwrap attached to said honeycomb core along at least two sides of said rectangular cross-section

17. The runner of claim 16 wherein said honeycomb core and said honeycomb overwrap comprise kraft material.

60

18. The runner of claim 16 wherein said honeycomb overwrap is attached to said honeycomb core along four sides of said rectangular cross-section.

19. A method for manufacturing a pallet comprising:
- 65 providing a pallet deck;
providing a honeycomb core;
providing an overwrap;
attaching said overwrap to at least two sides of said honeycomb core to create
a honeycomb support; and
70 attaching said honeycomb support to said honeycomb pallet deck.
20. The method of claim 19, wherein said step of providing a honeycomb core
comprises:
- 75 providing a first honeycomb layer; and
providing a second honeycomb layer.
21. The method of claim 19, wherein said step of providing an overwrap
comprises:
- 80 providing a honeycomb overwrap; and
providing a corner structure in said honeycomb overwrap, said corner structure
enabling said honeycomb overwrap to fold along desired lines.
22. The method of claim 21, wherein said step of providing a corner structure
comprises cutting a portion of said overwrap in a V-shape.
- 85
23. The method of claim 22, wherein said step of providing a corner structure
comprises crushing a portion of said overwrap.
24. The method of claim 19, wherein said step of providing an overwrap
90 comprises providing a corrugated overwrap.
25. The method of claim 19, wherein said step of providing a honeycomb core
comprises providing a single honeycomb layer runner and attaching to said single
honeycomb layer runner a plurality of honeycomb blocks, wherein said single
95 honeycomb layer runner extends across an entire width of said honeycomb pallet deck

and said plurality of honeycomb blocks are shorter than the single honeycomb layer runner.

26. The method of claim 19, further comprising providing a bottom sheet and attaching said bottom sheet to said honeycomb support.

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27. A support comprising:

a honeycomb runner having a rectangular cross-section;

a plurality of honeycomb pallet blocks attached to said honeycomb runner; and

a honeycomb overwrap wrapped around said honeycomb runner and said

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plurality of honeycomb pallet blocks.

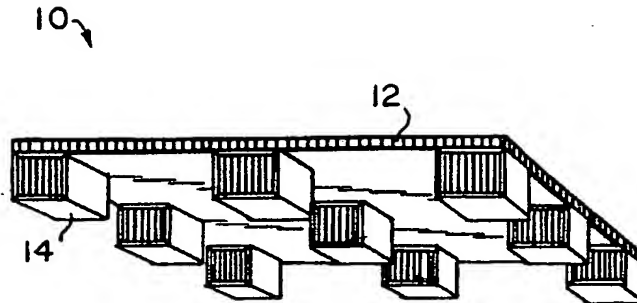


FIG. 1

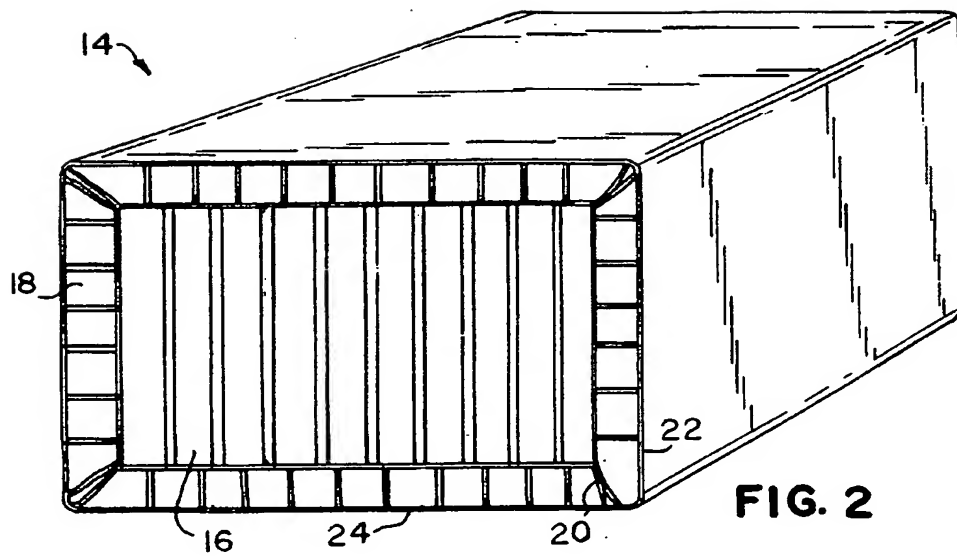


FIG. 2

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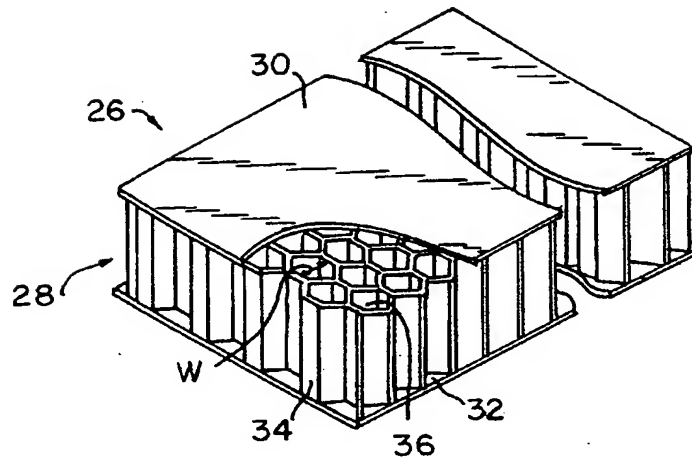


FIG. 3

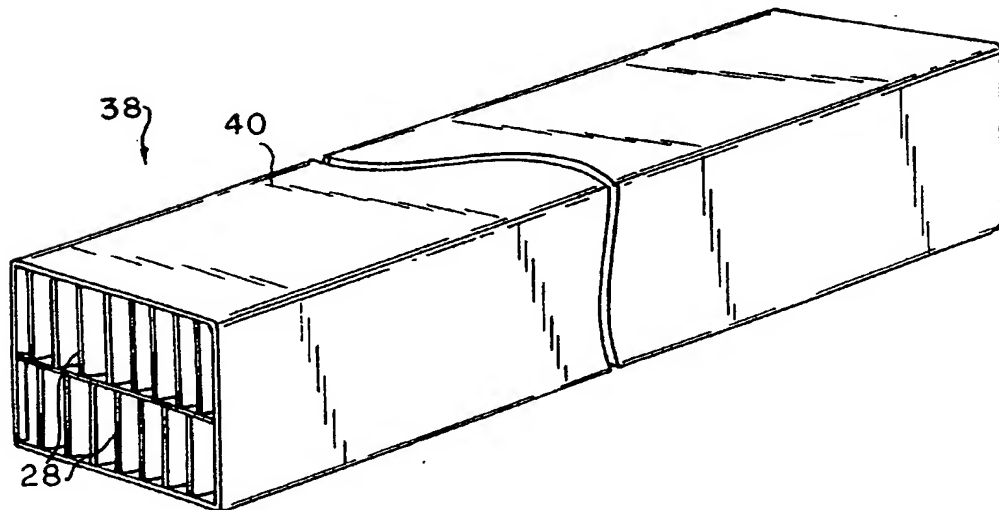


FIG. 4

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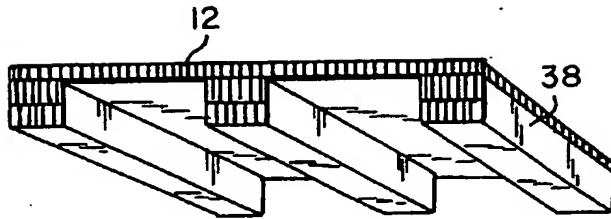


FIG. 5

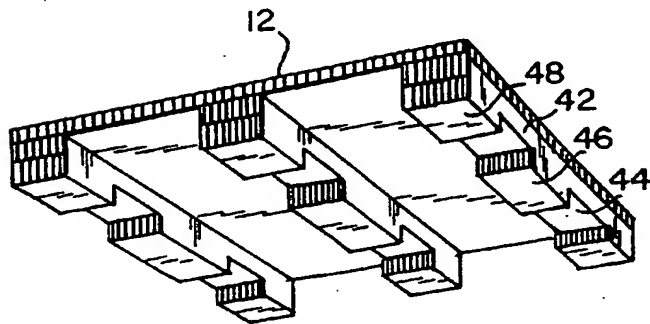


FIG. 6

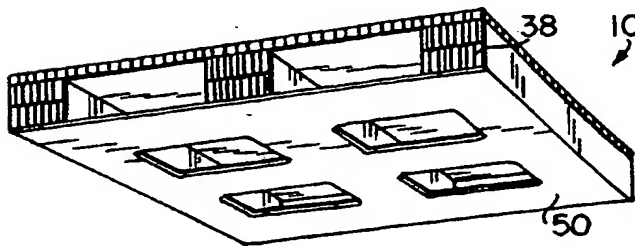


FIG. 7

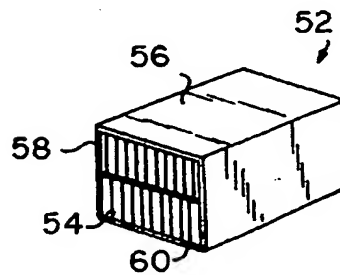
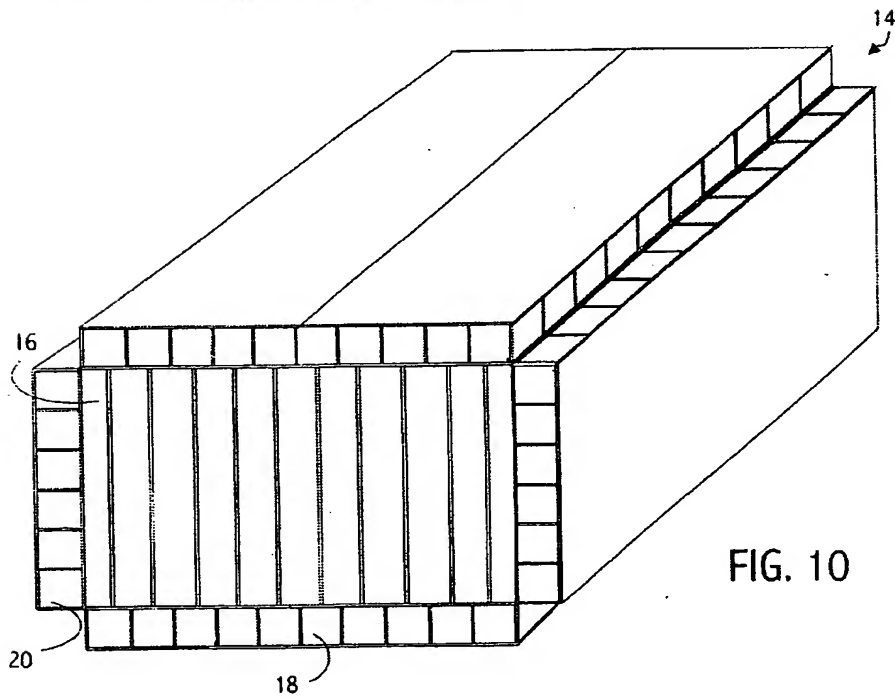
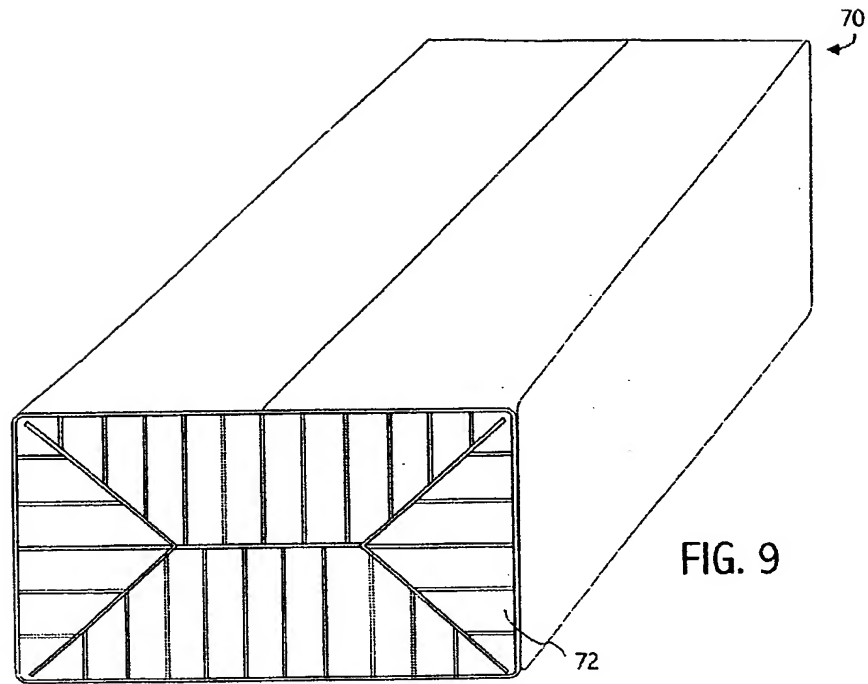
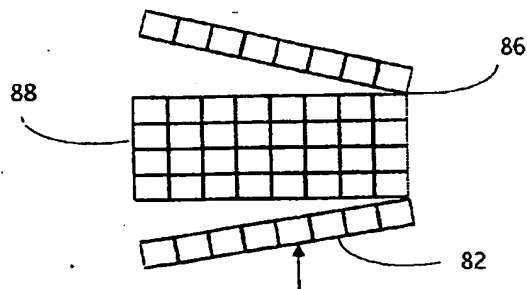
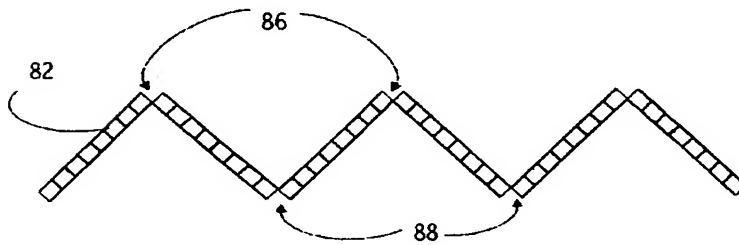
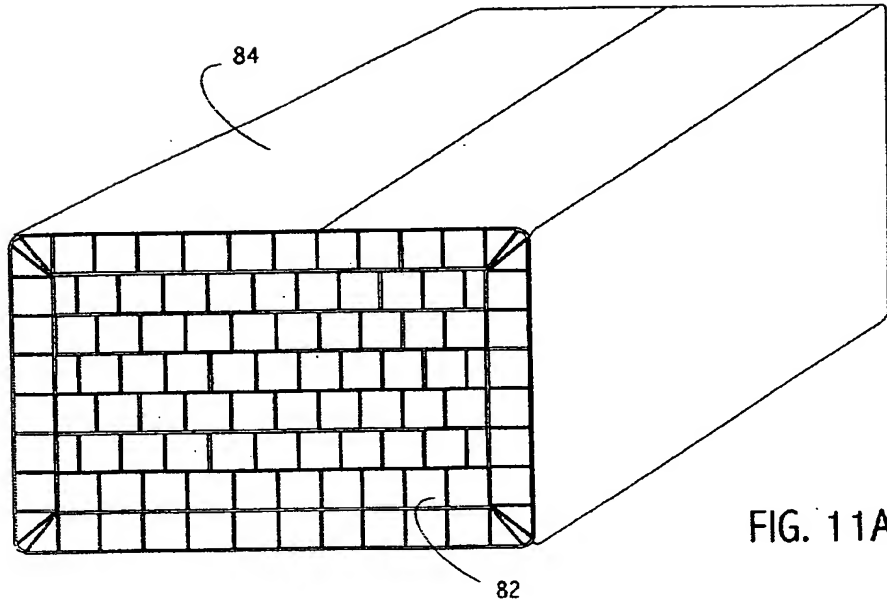


FIG. 8

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